{{<P=41><C=05><S=extension><T=MC><M=2><L=1><X=F><id=001>}}

4151001

F E There is a single-turn circular coil with diameter 5 cm. Its normal is at a right angle to a magnetic field of 3×10^{-3} T. The coil is then rotated through 90° so that its normal is parallel to the magnetic field. What is the change in magnetic flux through the coil due to this rotation?

A 5.89×10^{-6} Wb

B 2.36×10^{-5} Wb

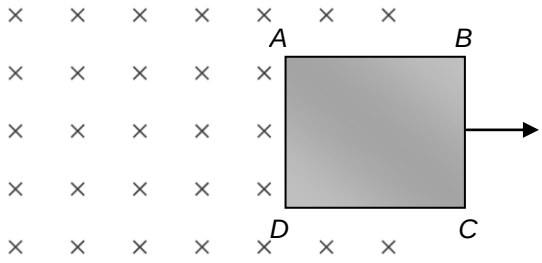
C -2.36×10^{-4} Wb

D -4.71×10^{-5} Wb

{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=002>}}

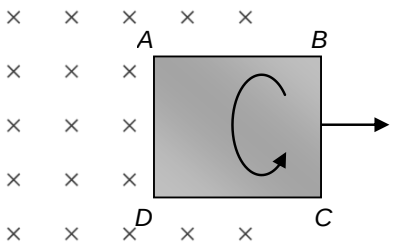
4151002

In the following figure, a metal plate *ABCD* is placed normally to a uniform magnetic field which is pointing into the paper. At the instant shown, the plate is moving to the right and an eddy current is induced in it.

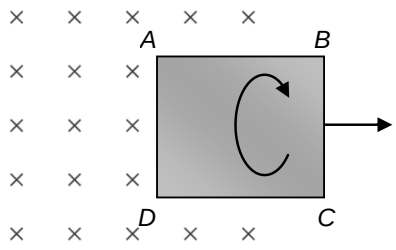


Which of the following diagrams best represents a possible path of the eddy current induced in the plate?

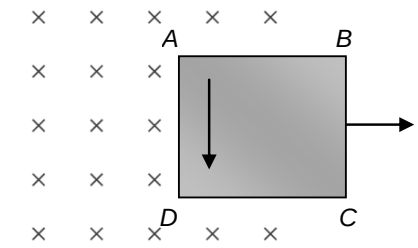
A



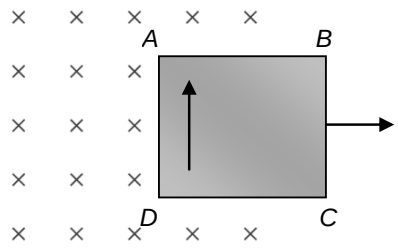
B



C



D



{{<P=41><C=05><S=extension><T=MC><M=2><L=1><X=F><id=003>}}

4151003

F E The length and cross-sectional area of a 1500-turn solenoid are respectively 0.3 m and 4.5 cm^2. A single-turn coil of cross-sectional area 3 cm^2 is placed in the middle of the solenoid. The plane of the coil is perpendicular to the magnetic field produced by the solenoid. When the solenoid carries a current of 2 A, what is the magnetic flux through the coil? (Given $\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

A 3.77×10^{-6} Wb

B 5.65×10^{-6} Wb

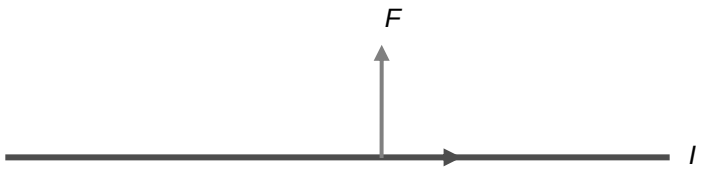
C 8.48×10^{-3} Wb

D 0.0126 Wb

{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=004>}}

4151004

An upward force *F* acts on a wire as shown. The induced current is *I*.



The wire must be put in a magnetic field

A pointing upwards.

B pointing downwards.

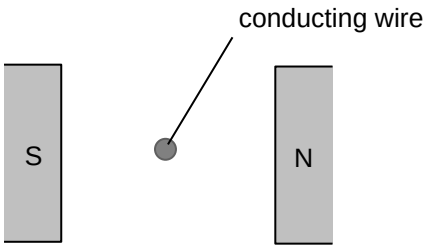
C pointing into the paper.

D pointing out of the paper.

{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=005>}}

4151005

A conducting wire is put in the middle of two magnets as shown in the following figure.



How should the wire move to induce a current flowing into the paper?

A Upwards

B Towards the right

C Downwards

D Towards the left

{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=006>}}

4151006

Which of the following properties of the induced current increase(s) with the rotating speed of the coil in an a.c. generator?

(1) Period

(2) Peak value

(3) Frequency

A (1) and (2) only

B (1) and (3) only

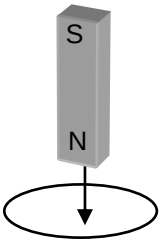
C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=007>}}

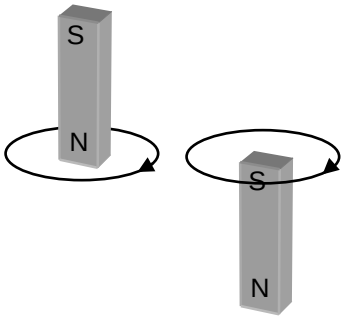
4151007

A magnet is released and falls vertically through a metal ring as shown below.

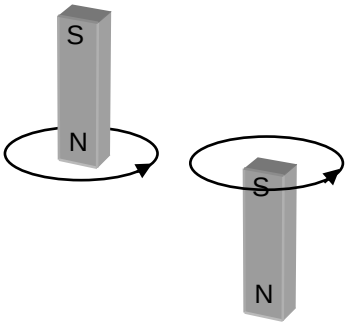


Which of the following figures correctly shows the directions of the induced current in the ring when the poles pass the ring?

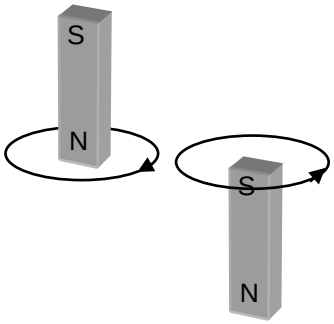
A



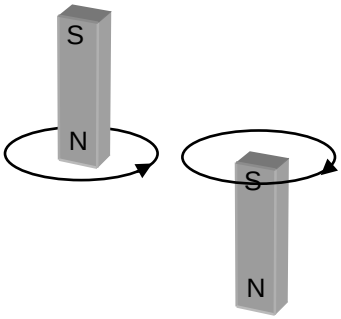
B



C



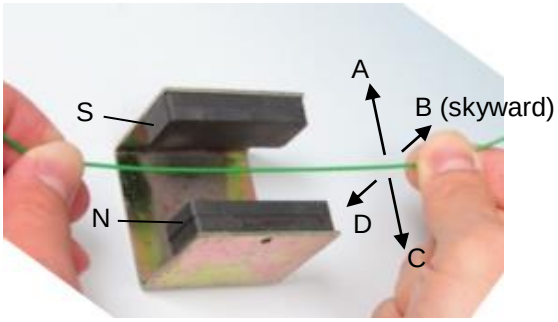
D



{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=008>}}

4151008

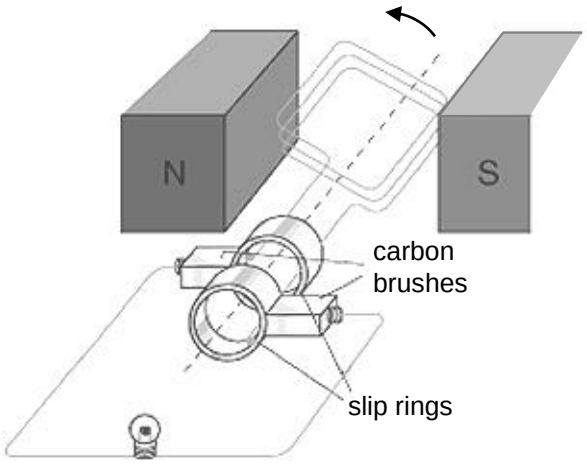
Part of a conducting wire is put between two magnets as shown below. In which direction should one pull the wire to induce a current flowing to the left?



{{<P=41><C=05><S=core><T=MC><M=2><L=1><X=H><id=009>}}

4151009

Which of the following statements about the generator shown below is correct?



A The slip rings enable the current through the lamp to flow in one direction.

B The slip rings reduce the voltage across the lamp.

C The frequency of the induced current increases with the rotating speed of the coil.

D The frequency of the induced current increases with the number of turns in the coil.

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=010>}}

4151010

★

F E The total magnetic flux linkage through a coil placed in a uniform magnetic field depends on

(1) the resistivity of the coil.

(2) the number of turns in the coil.

(3) the angle between the normal of the coil and the magnetic field.

A (1) and (2) only

B (1) and (3) only

C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=011>}}

4151011

★

F E Which of the following affects the magnetic flux density on the axis of a long solenoid?

(1) The radius of the solenoid

(2) The number of turns in the solenoid

(3) The current through the solenoid

A (1) only

B (1) and (2) only

C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=012>}}

4151012

★

F E A very long solenoid with a metallic core has a radius r and n turns per unit length. It carries a current I. The magnetic flux density B on its axis is

(1) independent of r.

(2) proportional to n.

(3) independent of the material of the core.

A (1) only

B (1) and (2) only

C (2) and (3) only

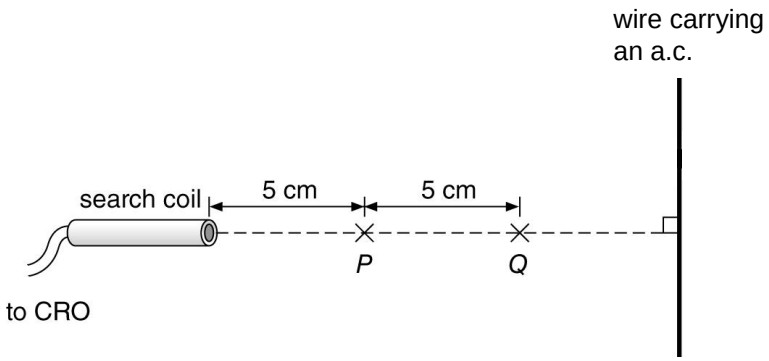
D (1), (2) and (3)

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=013>}}

4151013

★

F E The figure shows a long straight wire carrying an a.c. A small search coil is used to examine the magnetic field at P and Q. The readings of the CRO are ε_P and ε_Q respectively.



Which of the following statements are correct?

(1) ε_P is equal to ε_Q since the rates of change of the magnetic flux at these two points are the same.

(2) The maximum magnetic field at *Q* is larger than that of at *P*.

(3) ε_P increases when the frequency of the a.c. increases.

A (1) and (2) only

B (1) and (3) only

C (2) and (3) only

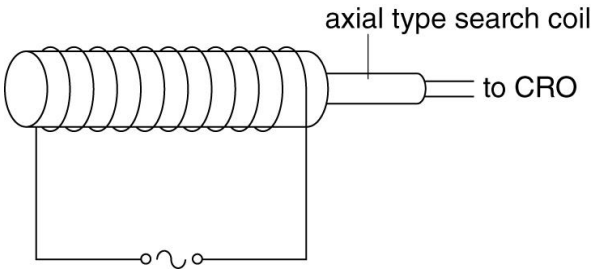
D (1), (2) and (3)

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=014>}}

4151014

★

F E An axial type search coil is connected to a CRO and placed inside a solenoid. The solenoid is connected to an a.c. power supply. The changing magnetic field in the solenoid induced an e.m.f. in the search coil



Which of the following changes will **not** affect the amplitude of the induced voltage in the search coil?

A Increasing the frequency of the a.c. in the solenoid

B Increasing the number of turns on the search coil

C Decreasing the current through the solenoid

D Replacing the solenoid with a longer one of the same number of turns per unit length

{{<P=41><C=05><S=extension><T=MC><M=2><L=2><X=F><id=015>}}

4151015

★

F E A single-turn coil of area A is placed in a uniform magnetic field. The coil is perpendicular to the magnetic field. If the magnetic field decreases constantly from B to zero in time t, what is the induced e.m.f. in the coil?

A BAt

B $\frac{BA}{t}$

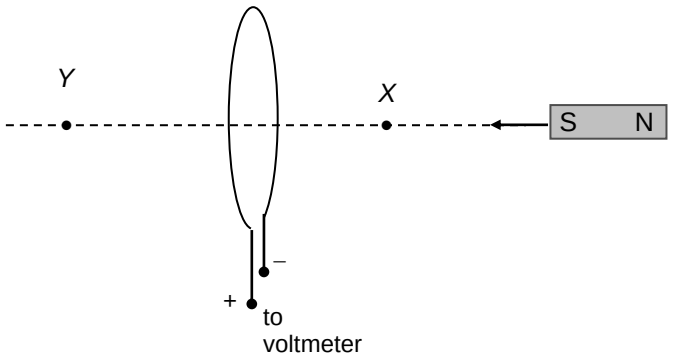
C $\frac{Bt}{A}$

D $\frac{At}{B}$

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=016>}}

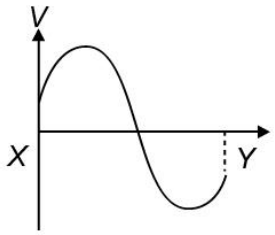
4151016

★ In the following figure, a magnet is moving towards a coil at a uniform speed.

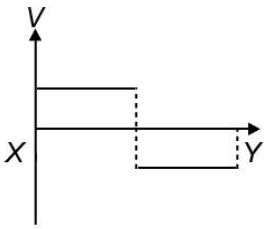


Which of the following graphs best represents the reading of the voltmeter when the magnet moves from X to Y?

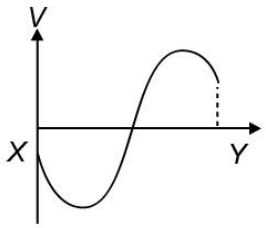
A



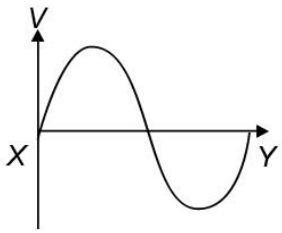
B



C



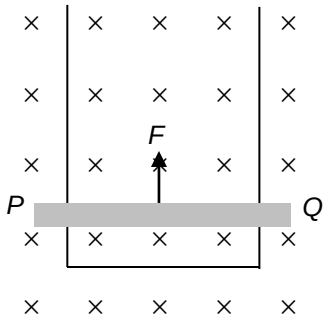
D



{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=017>}}

4151017

★ The following figure shows an iron rod which is pulled along conducting wires by a force *F* in a uniform magnetic field.



An induced e.m.f. is set up across the iron rod. Which of the following statements are correct?

(1) Current flows from *P* to *Q*.

(2) A larger e.m.f. will be induced across the iron rod if it moves at a higher speed.

(3) A steady e.m.f. will be induced across the iron rod if it moves at a uniform speed.

A (1) and (2) only

B (1) and (3) only

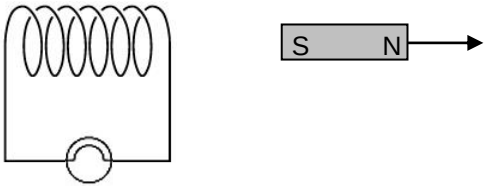
C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=018>}}

4151018

★ In the following figure, a magnet moves away from a coil, which is connected to a lamp.



Which of the following will increase the brightness of the lamp?

(1) Insert a soft-iron core into the coil.

(2) Increase the speed of the magnet.

(3) Move the coil in the direction opposite to that of the magnet.

A (1) and (2) only

B (2) and (3) only

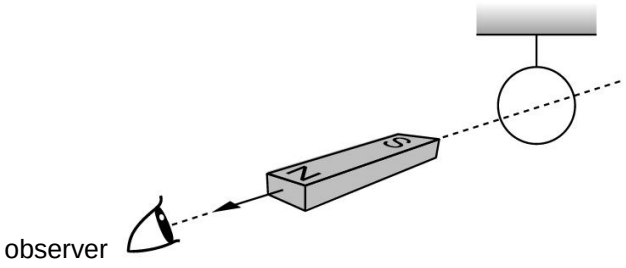
C (1) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=019>}}

4151019

★ A bar magnet is pulled away from a coil as shown in the figure below. The coil is hung by a nylon thread.



Which of the following statements is correct to the observer?

A An induced current flows along the coil in a clockwise direction and the coil remains at rest.

B An induced current flows along the coil in an anticlockwise direction and the coil vibrates up and down.

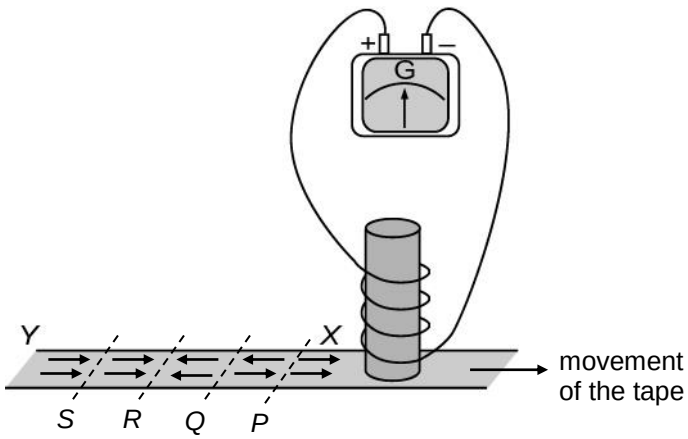
C An induced current flows along the coil in an anticlockwise direction and the coil swings towards the magnet.

D An induced current flows along the coil in a clockwise direction and the coil swings away from the magnet.

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=020>}}

4151020

★ In the following figure, a simple magnetic tape playback system is reading the magnetic pattern on a tape. The arrows show the orientations of the magnetic materials on the tape.



At which of the following positions is the galvanometer reading the greatest?

A *P*

B *Q*

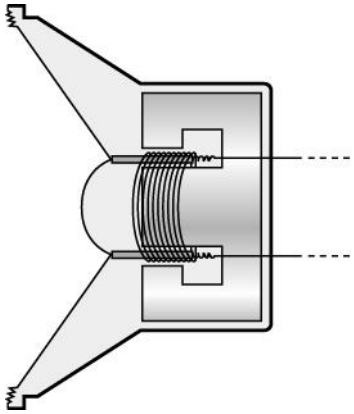
C *R*

D *S*

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=021>}}

4151021

★ The following figure shows a moving-coil microphone.



Which of the following statements about the microphone are correct?

(1) Its structure is similar to a moving-coil speaker.

(2) Using a stronger magnet can increase its sensitivity.

(3) Increasing the number of turns of the coil can increase its sensitivity.

A (1) and (2) only

B (1) and (3) only

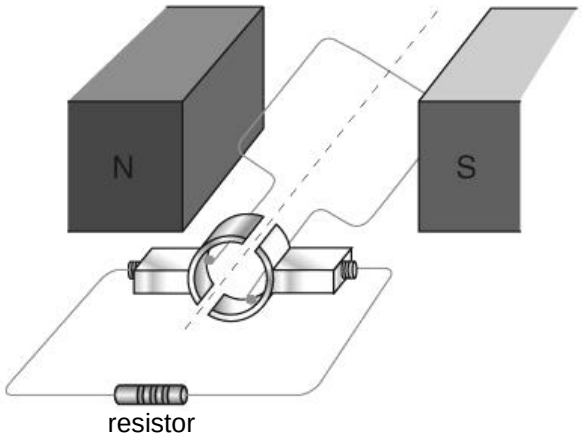
C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=022>}}

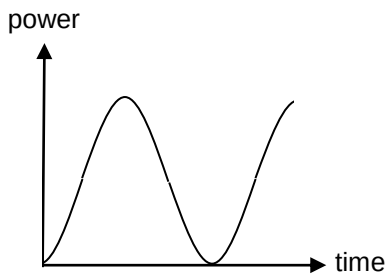
4151022

★ The following figure shows the coil of a generator rotating at a constant speed.

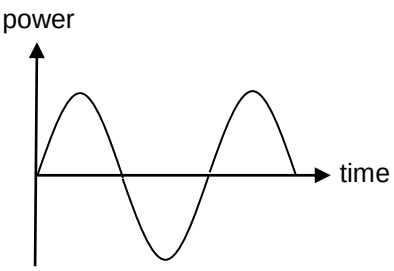


Which of the following graphs best shows the power dissipated in the resistor?

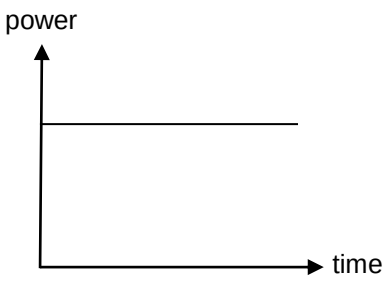
A



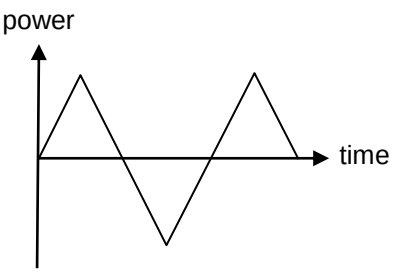
B



C



D



{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=023>}}

4151023

★ Which of the following **cannot** change the magnitude of the voltage induced in a d.c. generator?

A Change the polarity of the magnet

B Change the area of the coil

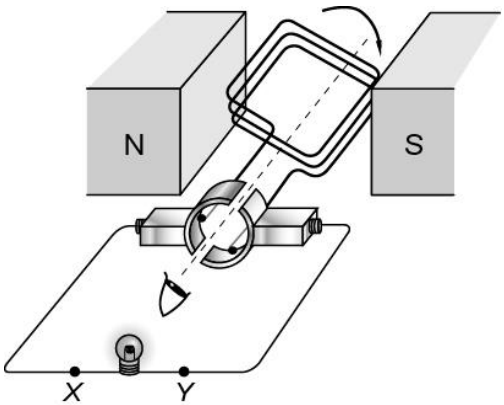
C Change the frequency of rotation of the coil

D Change the number of turns in the coil

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=024>}}

4151024

★ In the following figure, the coil in the simple generator rotates clockwise to the observer.



Which of the following statements about the generator is/are correct?

(1) It is an a.c. generator.

(2) The current produced passes through the lamp from *X* to *Y*.

(3) The brightness of the lamp increases with the rotation speed of the coil.

A (1) only

B (3) only

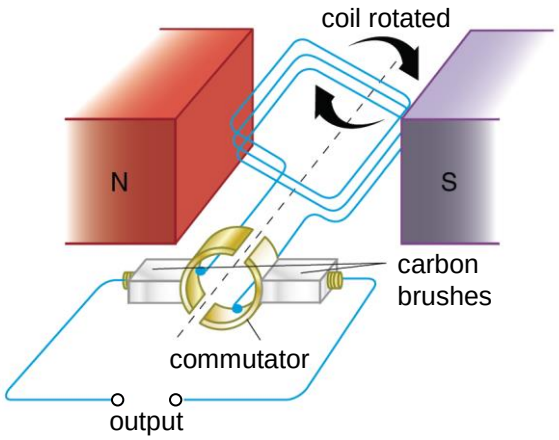
C (1) and (2) only

D (2) and (3) only

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=025>}}

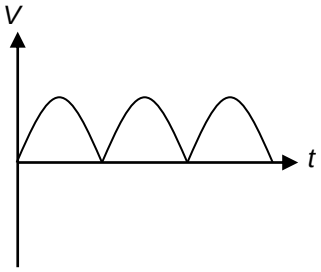
4151025

★ The figure below shows a generator. The coil rotates at a constant speed.

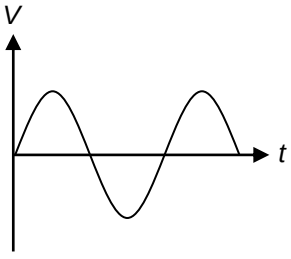


A voltmeter is connected across the output. Which of the following graphs best represents the reading of the voltmeter?

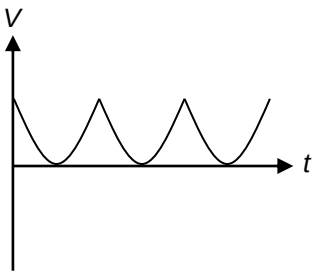
A



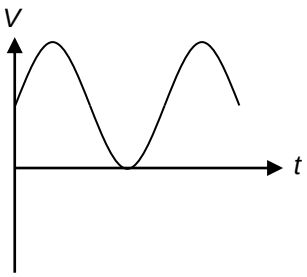
B



C



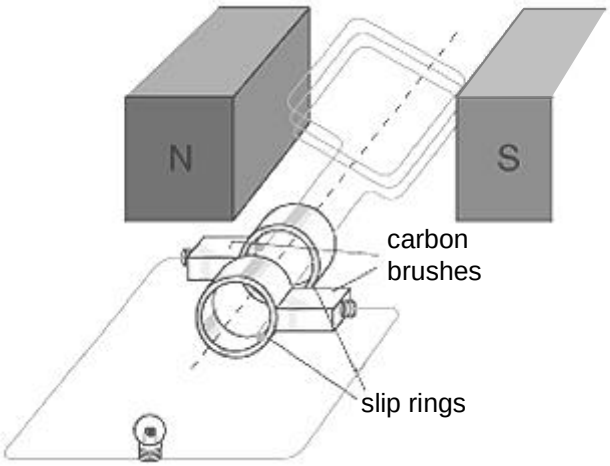
D



{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=026>}}

4151026

★ The following figure shows the structure of an a.c. generator.



Which of the following statements about the generator are correct?

(1) The induced current is the greatest when the coil is horizontal.

(2) The induced voltage is negatively largest when the coil is vertical.

(3) A greater voltage can be induced if the coil is wound on a soft-iron core.

A (1) and (2) only

B (1) and (3) only

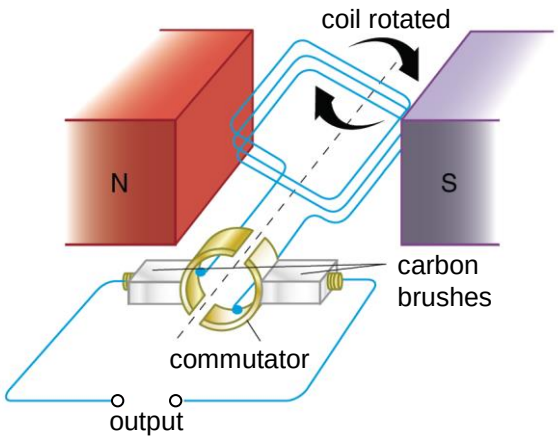
C (2) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=027>}}

4151027

★ The following figure shows a simple d.c. generator producing an induced current of frequency 10 Hz.



How long does it take for the coil in the generator to complete a revolution?

A 0.05 s

B 0.1 s

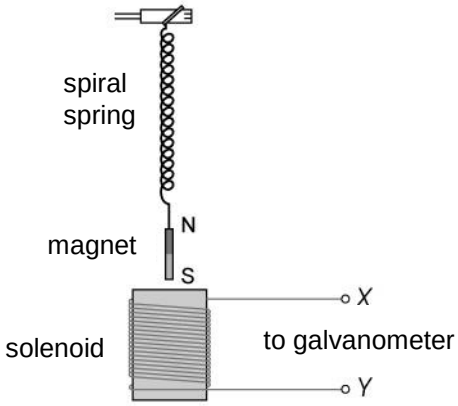
C 0.2 s

D 0.33 s

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=028>}}

4151028

★ In the following figure, a magnet is tied to a spring.



What is the motion of the magnet if it is pulled down slightly and then released?

A It stops where it is released.

B It is attracted further downwards and stops there.

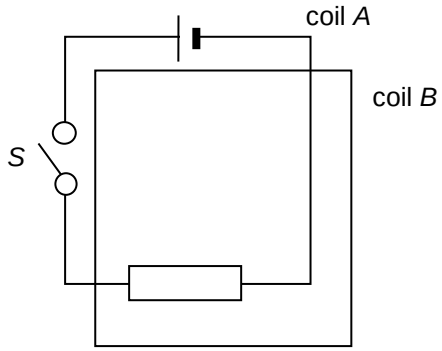
C It oscillates for a few times and comes to a stop.

D It keeps oscillating for a long time.

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=029>}}

4151029

★ In the following figure, coil *A* is placed behind coil *B*. Which of the following statements correctly describes what happens to coil *B* when switch *S* is closed?



A A current in clockwise direction is induced and fades away rapidly.

B A current in anticlockwise direction is induced and fades away rapidly.

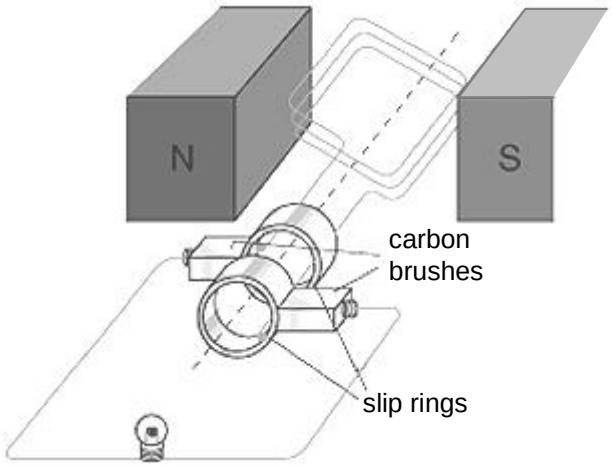
C A current in clockwise direction is induced and keeps flowing as long as switch *S* is closed.

D A current in anticlockwise direction is induced and keeps flowing as long as switch *S* is closed.

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=030>}}

4151030

★ Which of the following statements about the generator in the figure below is/are correct?



(1) It is a d.c. generator.

(2) The frequency of the voltage produced is equal to the rotational frequency of the coil.

(3) The voltage produced by the generator is constant.

A (1) only

B (2) only

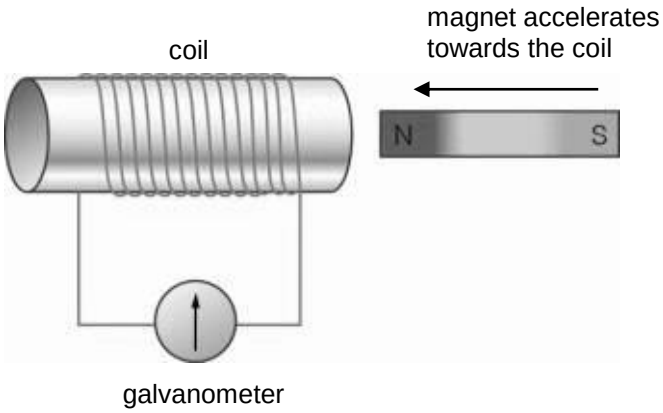
C (1) and (2) only

D (2) and (3) only

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=031>}}

4151031

★ A magnet accelerates towards a coil as shown below.



Which of the following statements is/are correct?

(1) The pointer of the galvanometer oscillates between a positive value and a negative value before the magnet enters the coil.

(2) The coil cuts the magnetic field lines at a changing rate as the magnet approaches the coil.

(3) The direction of the induced current can be found out by using Lenz's law.

A (1) only

B (3) only

C (1) and (2) only

D (2) and (3) only

{{<P=41><C=05><S=extension><T=MC><M=2><L=3><X=F><id=032>}}

4151032

★★

F E Magnetic flux is measured in weber. Which of the following is/are equivalent to weber ?

(1) N m C^{-1} s

(2) V s

(3) T m

A (1) and (2) only

B (2) and (3) only

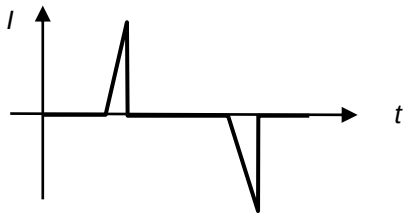
C (1) and (3) only

D (1), (2) and (3)

{{<P=41><C=05><S=core><T=MC><M=2><L=3><X=H><id=033>}}

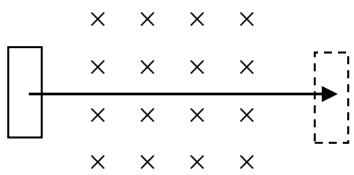
4151033

★★ A conducting coil moves across a uniform magnetic field pointing into the paper. The following graph shows the variation of the current induced in the coil with time.

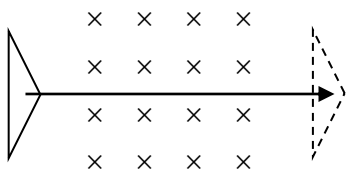


If the coil moves with a constant speed, which of the following figures best represents the movement of the coil?

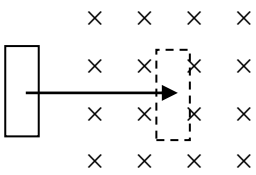
A



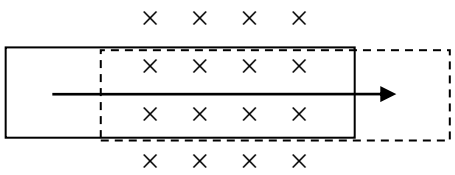
B



C



D



{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=034>}}

4151034

★

1st statement	2nd statement
In an a.c. generator, increasing the rotating speed of the coil can increase the amplitude of the induced voltage.	The voltage induced in a conductor increases with the speed at which the conductor cuts through the magnetic field lines.

{{<P=41><C=05><S=core><T=MC><M=2><L=2><X=H><id=035>}}

4151035

★

1st statement	2nd statement
A magnet always experiences repulsion when it moves towards a current-carrying coil.	Lenz's law states that an induced current will flow in a direction to oppose the change that produced it.